



U40-8950036-05-B
 IDENTIFICATION
 WPS
 ER308L/STIFFENER

CONTRACT
 930212

WELDING PROCEDURE SPECIFICATION

PRODUCT LIGO BEAM TUBE MODULES
 CUSTOMER CALTECH
 PAGE 1 OF 3
 REV. NO. 5
 BY DMF DATE 06/26/95

WORK THIS DOCUMENT WITH GENERAL WELD PROCEDURE SPEC. GWPS GMAW&FCAW

REFERENCE PROCEDURE QUALIFICATION RECORD			SPECIFIC CONTRACT	
NO.	POSITION QUALIFIED (QW-405)	THICKNESS QUALIFIED (QW-403)	POSITION (QW-405)	THICKNESS RANGE (QW-403)
4858	2G	All size fillet welds	3F	1/8" to 3/8"

SPECIFIC CONTRACT WPS REQUIREMENTS

CODE EDITION AND ADDENDA ASME Section VIII & IX, 1992 Edition, 92 Add.

JOINTS (QW-402) SEE GENERAL WELDING TECHNIQUE PAGE 3	PREHEAT/INTERPASS TEMPERATURE (QW-406) SEE ATTACHED PAGE 2
BACKING MATERIAL (QW-402) None Required	POST WELD HEAT TREATMENT (QW-407) PWHT REQUIRED No IF PWHT IS REQUIRED, SEE APPROVED
BASE MATERIAL (QW-403) A240 Tp. 304L (ASME P-8, Gp. 1) Any ASME P-8, Gp. 1 material may be welded together or to each other in any combination.	CONTRACT PWHT PROCEDURE FOR DETAILS AND EXTENT OF PWHT.
	GAS (QW-408) COMPOSITION: SHIELDING: 98% Ar - 2% O2 FLOW RATE: 20-45 cfh BACK UP 100% Nitrogen FLOW RATE: See page 2
FILLER MATERIAL (QW-404) ASME SPECIFICATION NO: SFA 5.9 ASME CLASSIFICATION: ER308L * ASME ANALYSIS NO: A-8 ASME GROUP NO: F-6 CONSUMABLE INSERT: N/A SUPP. POWDER FILLER: N/A	ELECTRICAL CHARACTERISTICS (QW-409) CURRENT: Direct Current POLARITY: Electrode Positive OTHER: Reverse Polarity AMPERAGE AND VOLTAGE RANGE. SEE PAGE 3
	VOLUME OF WELD METAL REQUIRED No SEE ATTACHED PAGE N/A MODE OF TRANSFER Globular or Spray
FLUX (QW-404) N/A	TECHNIQUE (QW-410) / SPECIAL LIMITATIONS SEE ATTACHED PAGE(S) 2, 3 STRINGER OR WEAVE TECHNIQUE SEE PAGE 3 TYPE OF WELDING MANUAL <input type="checkbox"/> MACHINE <input checked="" type="checkbox"/> SEMI-AUTOMATIC <input type="checkbox"/> AUTOMATIC <input type="checkbox"/>
CUSTOMER APPROVAL	* ER308L in accordance with WMS-ER308L.

REVISIONS	OB ENGR	DIST ENGR	WELDIN SERVICE HOUSTON	CORP QA	REG CONST QA	REG MFG QA		BY	DATE
								RWP	01/10/94
								BGG	02/28/95
								AUTHORIZED	

APPROVED
 M. Jellal... 11/10/95
 J. Jones 11/10/95

PRODUCT LIGO BEAM TUBE MODULES
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LIMITATIONS:

1. Maintain a contact tip to work distance of 3/8" to 1".
2. Use a gas cup nozzle sizes between 3/8" to 1" diameter. The gas cup nozzle shall cover the contact tip 1/8" minimum.
3. Use a single pass per side technique.
4. No single pass shall exceed 1/2" in thickness.
5. The WPS is limited to the welding of the stiffener to the tube modules only.
6. Only stainless steel brushes shall be used on stainless steel.
7. A purge using 100% nitrogen must be in place before any tacking or welding. The oxygen content shall be less than 2.0%.
8. No welding over the spiral tube weld shall exist.
9. The length not welded over the spiral weld shall be minimized.
10. Miller 4-roll wire feeder shall be used.
11. Straight machine torch (approx. 3 feet in length) shall be used.
12. Use Procedure FPSTIFFENER for fitting/purging.

INTERPASS TEMPERATURE:

The interpass temperature shall not exceed 350°F.

PREHEAT REQUIREMENTS (ASME P-8, Gp. 1):

No preheat is required except as an aid to remove moisture unless the ambient temperature falls below 0°F. When the ambient temperature falls below 0°F, a preheat of warm to the hand (approx. 100°F) is required within 3" of where the welding is started and maintained 3" ahead of the arc.



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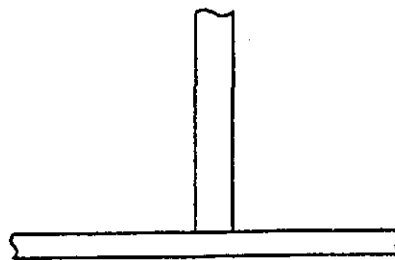
CONTRACT
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GENERAL WELDING TECHNIQUE

Operation Description	Beads	Weld Proc.	Electrode		Current (amps)	Voltage (Volts)	Peak (amps)
	Layer		Size	Type			
Stringer Beads	As Req'd	GMA	.035	ER308L*	190-230	22-24	
Travel speed: 33 to 37 ipm. Wire feed speed: 490 to 520 ipm.					* ER308L in accordance with WMS-ER308L.		

JOINT DETAIL - See contract drawings for applicable joint details and dimensions.



3F
(vertical downhill)



PROCEDURE QUALIFICATION RECORD TO A.S.M.E. SECTION IX ESSENTIAL VARIABLES

PQR No. 4858

Process GMAW/GTAW GTAW GTAW

Material specification SA204 Type 304 Manual Machine Automatic Semiautomatic

ASME p. no. 8, Gp. 1 To ASME p. no. 8, Gp. 1 Flux trade name None Required

Thickness (if pipe, dia and wall thick) 1/4" Inert gas composition *

Filler metal group no. F. F-6 Flow rate GMAW-40 CFH, GTAW-20CFH

Weld metal analysis no. A. A-8 Preheat temperature range 70°F to 350°F IPT

ASME specification no. SFA-5.9 Postweld heat treatment None

AWS specification no. A-5.9

WELDING PROCEDURE

Single or multiple pass Multiple Single or multiple arc Single Position 2G

Mode of transfer for GMAW: Spray Globular Pulsating Short Circuit

Filler Metal for GTAW or PAW Not Required Filler metal diameter Not Required

Electrode GMAW-ER308, GTAW-EWTh-2 Electrode diameter GMAW-.035", GTAW-3/32"Ø

Type of backing None** Welding current GTAW-Direct Current, Elec. Neg.

Consult WELDING VARIABLES for joint dimensions and welding current settings. (Straight Polarity)

TEST RESULTS

GMAW-Direct Current, Elec. Pos.
(Reverse Polarity)

Reduced Section Tensile Results

Specimen No.	Dimensions in		Area in ²	Ultimate Total Load Kips	Ultimate Unit Stress		Character of Failure and Location
	Width	Thickness			ksi	MPa	
H610R-1	1.498	0.222	0.332	29.5	88.9	612.9	Ductile in WM
H610R-2	1.502	0.220	0.330	29.1	88.2	608.1	Ductile in WM

Guided Bend Test

Type	Result	Type	Result
2 Transverse Face Bends	OK	2 Transverse Root Bends	OK

Welder's name Curtis Campbell Social Security no. 403-36-4037 Welder's Symbol CC

Who by virtue of these tests meets welder performance requirements.

Work Order (Orig. WPS) No. H610R - Rev. 0

We certify that the statements in this record are correct and that the test weld was prepared, welded and tested in accordance with the requirements of Section IX of the ASME code.

Signed CBI

By J. S. Lee J. S. Lee Date 10/15/80

Remarks: *GTAW - 100% Argon
GMAW - 98% Argon/2% Oxygen

**Temporary copper chill bar used.

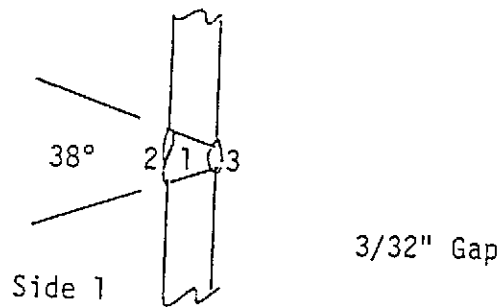
Updated to new form, 8/28/87, JSL JSL



PROCEDURE QUALIFICATION RECORD

To A.S.M.E. Section IX

PART III WELDING VARIABLES



HORIZONTAL

Layer	Electrode		Amps	Volts	Travel Speed in./min.	Remarks (Gas Flow etc)
	Type	Size				
1	ER308	.035	150	24	7	GMAW-Stringer
2	ER308	.035	150	24	19	Beads Side 1
3	EWTH-2	1/8"	120	12	---	GTAW with out filler
						metal Side 2.

Qualification No. 4858

Date: 10-15-80

Alan E. Hudson

BY

Alan E. Hudson